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Preliminary Note on the North American Species of the Genus Tissa, Adans.

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Botanists have had great difficulty in limiting the species of Sand Spurrey. There is, indeed, perhaps no other genus of flowering plants concerning whose specific composition more widely diverse views have been propounded. Thus we find Mr. Bentham in 1862 (Genera Plantarum, i. 152) regarding the species as "3 vel 4," while N. C. Kindberg's elaborate Monograph of the following year (Nova Acta Reg. Soc. Sci. Upsal. (III.) vii. fasc. i.) contains descriptions and figures of not less than 25. Durand's recent "Index Generum Phanerogamorum" repeats the Benthamian view, which Baillon also apparently defends (Histoire des Plantes, ix. 116) saying "species ad 3." This last is the latest expression we have had on the subject, published indeed, during the past year, and we may now look with much interest for the dictum of the distinguished authors of "Die Naturliche Pflanzenfamilien" which has not as yet treated of the Carophylleæ.

So far as North American botanists have been concerned with their native plants, there has not been much difference of opinion expressed—however much may have otherwise existed—for the species have never yet been systematically brought together. The Eastern Manuals have recognized three species; the Botany of California describes two (one of them also eastern), four new species have recently been named, another (if my supposition is correct) frequent in the alkaline area of the Andes, extends to Southern California, and still another, abundant in the Mediterranean region, is found in our Western and Southern States. I have not ventured to unite any of these species, nor to describe any more, although there are plenty of indications from the herbaria that other forms, species or varieties will sooner or later claim recognition. I have thus recognized ten species, all but one of which occur within the United States. The apparently great divergence from the views of the eminent English and French authors above mentioned is readily explicable by stating that the material on which the additional five or six species I have been able to recognize is based, is quite new, and none of them have been studied by either Bentham or Baillon. It is to Professor Greene that I am indebted for much of the material which has thrown most light on the Pacific Coast forms, and he informs me that he has evidence of the existence of other forms, specimens of which in satisfactory amount and condition for critical study are not yet available. So far as the twenty-five species recognized by Kindberg are concerned, I am entirely satisfied that they are mainly artificial, and actually represent not many more than the three or four of Bentham or Baillon.

It is hardly necessary that I should discuss the generic name of these plants; Professor Greene has very recently alluded to it in "Pittonia," and M. Baillon has adopted it in his "Histoire." Suffice it to say that there is no valid choice in the matter, for 1763, the date of Adanson's "Familles des Plantes," is fifty-four years before the publication of *Lepigonum*, and a little more than that earlier than *Spergularia*. There is no doubt whatever as to what Adanson meant, and hence it becomes a matter of mere priority of publication, for which fifty-four years will be considered ample, I believe, by even the most conservative. Adanson considered that the species known at his time formed two genera, and called the other one *Buda*, under which species have been named by DuMortier in his "Florula Belgica;" this view has not been accepted by any recent botanist, and as *Tissa* occurs first in Adanson's work, it has priority of place and must stand as the generic appellation of these interesting plants.

Through the courtesy of Mr. Redfield and Dr. Watson I have been able to make quite careful examinations of the materials in the Cambridge and Philadelphia herbaria.

(A) ANNUALS; ROOTS FIBROUS.

* Species of the sea-beaches or salt-marshes or of the borders of salt lakes; leaves very fleshy; stamens (always? 10;) petals pink, (varying to white?).

1. TISSA MARINA (L.) (*Arenaria rubra*, L., var. *marina*, L., Sp. Pl. 606 (1753); including *Lepigonum marinum*, Kindb.

Monog. 18, at least in so far as the North American plants are concerned, *Lepigonum medium*, Fries and *L. leiospermum*,Kindb. l. c. 23).

Stout, erect or ascending, smooth or glandular-pubescent; capsule 5–8 mm. long at maturity; pedicels short (seldom more than twice this length); seeds smooth, margined or marginless, or roughened with projecting points or processes, several kinds sometimes found within the same capsule; leaves often much clustered in the axils.

Hab. Along the whole coast on both sides of the continent, apparently less abundant on the Gulf of Mexico; also about saline lakes and on alkaline soil in the interior.

2. TISSA SALINA (Presl.) (*Spergularia salina*, Presl. Fl. Cech. 93 (1819,) *fide* Kindberg.

Slender and spreading, low, abundantly branching, generally diffuse, and apparently always so in its fully developed state, entirely smooth; pedicels long, slender, more than twice the length of the capsule, which is 4-6 mm. long at maturity and twice the length of the calyx; leaves generally simply opposite; seeds papillose or smooth.

Hab. In the sand or mud of sea-beaches, more rarely (if at all) on the meadows, coast of New England and Canada. Not seen from further south than Eastport (Farlow) or South Gouldsboro (Redfield).

This is an extremely well marked species, as I understand it, and I have little doubt that it is the same thing that occurs on the shores of northern Europe, although comparison with more European specimens is very desirable. This restricts its range much within the limits assigned by Kindberg, who by going mainly upon the seeds has included in this, as in other species, a large number of diverse elements. Certainly in these two species the seed characters are of but little value.

* * Species of non-saline distribution.

† Petals pink.

3. TISSA RUBRA (L.) (*Arenaria rubra*, L. l. c.; *Spergularia rubra*, Presl; *Lepigonum rubrum*, Fries).

Depressed, spreading or ascending, very leafy to the flowers; stipules ovate-lanceolate, acuminate; plants smooth or but slightly pubescent.

Hab. In dry, especially sandy soil along both the Atlantic and Pacific coasts, not seen west of the Alleghanies nor east of California, and generally appearing as if introduced. Indeed I have not met with evidence that it is really indigenous in East America, and from its being so common a weed in Europe, our plant may very likely be of exotic origin.

4. TISSA DIANDRA (Guss.) (*Arenaria diandra*, Guss. Fl. Sic. Prodr. 1, 515 (1827); *Arenaria salsuginea*, Bunge in Ledeb. Fl. Alt. ii. 163 (1829); *Lepigonum salsugineum*, Kindb. l. c 42 and Syn. 7).

Spreading or bushy branched from the base; stipules ovate, acute; peduncles leafless or nearly so; plant glandular pubescent.

Hab. Galveston, Texas (Lindheimer); Rio Brazos, Texas (Drummond, 97 in Herb. Gray.); Sierra Valley, Cal. (Lemmon, 1874, doubtfully referred to this species); sandy bank of the Columbia River, W. Klickatat Co., Washington (Suksdorf, 176); also collected by Mr. Henderson in the same region in 1885. Our plant agrees very nearly with authentic specimens from Arabia. Its specific separation from *T. rubra* is open to question.

† † Petals none.

5. TISSA GRACILIS (S. Wats.) (*Lepigonum gracile*, S. Wats. Proc. Amer. Acad. xvii. 367 (1882).

Capsules 2-4 mm. long, slightly exceeding the calyx; seeds tuberculate; plants small and delicate, 4-8 cm. high.

Hab. Los Angeles, Cal. (Parry, No. 15, 1881); Otay, San Diego Co. (Orcutt, 1201); wet sands near Dallas, Texas (Reverchon in Curtiss, No. 333* distributed as *S. Mexicana*, Hemsl.)

6. TISSA TENUIS, Greene in litt. (*Lepigonum tenue*, Greene, Pittonia, i. 63 (1887).

Capsules 6-8 mm. long, twice the length of the calyx; seeds smooth, plants much larger, and more branched than in the last.

This fine species may, perhaps, better be grouped with Nos. 1 and 2, as its habitat appears to be near the sea, if not, indeed within its influence.

Hab. Alameda, Cal. (Greene); Santa Barbara (Rothrock, 154); Santa Monica (J. C. Nevin).

(B) PERENNIALS; STEMS CÆSPITOSE FROM A THICK, WOODY ROOT.

* Maritime or alkaline flat species of the Pacific Coast.

7. TISSA MACROTHECA (Hornem.) *Arenaria macrotheca*, Hornem. in Cham. & Schlecht., Linnæa, i. 53 (1826); *Lepigonum macrothecum*, Fisch. & Meyer, Cat. Sem. Hort. Petrop. 1835).

Leaves broadly linear, 2-3 mm. wide, 2-5 cm. long; stems stout, ascending; plants dark green, entirely smooth or densely glandular pubescent.

Hab. Oak Bay, Vancouver Island (Macoun) and southward to Southern California both maritime and inland, as on "alkaline lands San Bernardino Valley, perennial, fleshy rooted, almost tuberous," (Parish, 1331).

Var. SCARIOSA, n. var. Low, (2-10 cm.), glandular; leaves broader, lanceolate-linear, crowded; stipules very large and conspicuous, ovate-acuminate, nearly as long as the leaves.

Hab. Near San Francisco (Torrey, No. 41); coast of Monterey (Hooker and Gray, 1877); and Cypress Point, near Monterey, on maritime rocks (Gray, 1885).

8. TISSA PALLIDA, Greene, in litt. Leaves broadly linear, ½ cm. long, smooth; pedicels, calyx and upper portion of the stem densely glandular pubescent, lower leaves and joints of the stem smooth; plants stout, very light colored, whence the name.

Hab. Clayey bluffs overhanging the sea, prostrate, forming dense tufts, near San Francisco, June, 1887 (Greene); Monterey? (Meehan in Herb. Phila.).

9 TISSA VILLOSA (Pers.), Britt., Bull. Torr. Club, xvi. 62.

Leaves filiform-linear, densely clustered in the lower axils, stems erect or ascending, slender, glandular pubescent; plant dark green.

Hab. In alkaline soil, Southern California, San Diego, (Cleveland, 526); alkaline ground, San José (Mrs. A. E. Bush, 1879). Also in western South America. The Californian plants differ very slightly from Andean specimens in having smaller capsules, but I have little hesitation in referring them to this species.

* * Species of the mountainous regions of North Mexico.

10. TISSA MEXICANA (Hemsl.) (*Spergularia Mexicana*, Hemsl. Bot. Biol. Cen.-Amer.).

Leaves hardly succulent, flowers "yellowish."

Hab. Near San Luis Potosi (Parry and Palmer).